

REMARKS

Applicants request favorable reconsideration and allowance of the subject application in view of the preceding amendments and the following remarks.

Claims 16, 17, 20-23, 28 and 32-41 are presented for consideration. Claims 16, 17, 20, 28, 32, 37 and 41 are independent. Claims 29-31 have been canceled without prejudice or disclaimer. Claims 16, 17, 32 and 33 have been amended to clarify features of the subject invention, while claims 34-41 have been added to recite additional features of the subject invention. Support for these changes and these claims can be found in the original application, as filed. Therefore, no new matter has been added.

Applicants note with appreciation that claims 20-23 and 28 have been allowed over the art of record. In addition to these claims being allowable, Applicants submit that claims 16, 17 and 32-41 also patentably define features of the subject invention. These claims, therefore, should likewise be deemed allowable.

Applicants request favorable reconsideration and withdrawal of the rejection set forth in the above-noted Office Action.

Claims 16, 17 and 29-33 were rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-15 of U.S. Patent No. 6,614,535 to Kakuchi et al. This rejection is respectfully traversed. Nevertheless, Applicants submit that independent claims 16, 17, 32, 37 and 41, for example, as presented, amplify the distinctions between the present invention and the cited art.

In one aspect of the present invention, independent claim 16 recites an exposure method including the steps of illuminating a reticle, by use of light from an exposure light source, projecting a pattern of the reticle onto an object to be exposed, by use of a projection optical system, and measuring an optical characteristic of the projection optical system by use of an interferometer and on the basis of light from the exposure light source. The measuring step includes (i) a step of dividing light from the light source and passed through the projection optical system into two light beams, (ii) a step of laterally shifting one of the divided two light beams relative to the other light beam, and (iii) a step of causing interference between the two relatively, laterally shifted light beams.

In another aspect of the present invention, independent claim 17 recites a device manufacturing method including the steps of preparing a reticle, illuminating the reticle, by use of light from an exposure light source, projecting a pattern of the reticle onto an object to be exposed, by use of a projection optical system, and measuring an optical characteristic of the projection optical system by use of an interferometer and on the basis of light from the exposure light source. The measuring step includes (i) a step of dividing light from the light source and passed through the projection optical system into two light beams, (ii) a step of laterally shifting one of the divided two light beams relative to the other light beam, and (iii) a step of causing interference between the two relatively, laterally shifted light beams.

In yet another aspect of the present invention, independent claim 32 recites a projection exposure apparatus including a projection optical system for projecting a pattern of a reticle, illuminated with light from a light source, onto an object to be exposed, and an interferometer for

measuring an optical characteristic of the projection optical system by use of light from the light source. The interferometer is arranged so that (i) light from the light source and passed through the projection optical system is divided into two light beams, (ii) one of the two divided light beams is laterally shifted relative to the other light beam, and (iii) interference is caused between the two relatively, laterally shifted light beams.

In a further aspect of the present invention, independent claim 37 recites a projection exposure apparatus including a projection optical system for projecting a pattern of a reticle, illuminated with light from a light source, onto an object to be exposed, and an interferometer for measuring an optical characteristic of the projection optical system by use of light from the light source. The interferometer is arranged to produce reference light on the basis of light from the light source and passed through the projection optical system, and also to cause interference between the reference light and the light from the light source and passed through the projection optical system.

In still another aspect of the present invention, independent claim 41 recites a device manufacturing method including the step of preparing a reticle, illuminating the reticle by use of light from a light source, projecting a pattern of the reticle onto an object to be exposed, by use of a projection optical system, and measuring an optical characteristic of the projection optical system by use of an interferometer and on the basis of light from the light source. The measuring step includes (i) a step of producing reference light on the basis of light from the light source and passed through the projection optical system, and (ii) a step of causing interference between the

reference light and the light from the light source and passed through the projection optical system.

By such an arrangement, in the present invention recited in independent claims 16, 17, and 32, for example, the light from the light source and passed through the projection optical system is divided into two light beams, with one of the two divided light beams being laterally shifted relative to the other light beam, and interference being caused between the two, relatively, laterally shifted light beams. In accordance with this feature of the invention, a light source having a relatively short coherence length can be used as the light source of the interferometer. That is, the exposure light source, such as the excimer laser, itself, can be used as the light source of the interferometer.

In other aspects of the invention, independent claims 37 and 41 recite, among other features, that, in the interferometer, the reference light can be produced on the basis of light from the light source and passed through the projection optical system. In accordance with this feature of the invention, as well, a light source having a relatively short coherence length can be used as the light source of the interferometer.

Applicants submit that the cited art does not teach or suggest such features of the present invention, as recited in independent claims 16, 17, 32, 37 and 41. Specifically, Applicants submit that claims 1-15 of the Kakuchi et al. patent are silent with respect to the salient features of Applicants' present invention, as recited in the noted independent claims.

For the foregoing reasons, Applicants submit that the present invention, as recited in independent claims 16, 17, 32, 37 and 41, also is patentably defined over the cited art.

Dependent claims and 33-36 and 38-40 also should be deemed allowable, in their own right, for defining other patentable features of the present invention in addition to those recited in their respective independent claims. Further individual consideration of these dependent claims is requested.

Applicants further submit that this Amendment After Final Rejection clearly places this application in condition for allowance. This Amendment was not earlier presented because Applicants believed that the prior Amendment placed the application in condition for allowance. Accordingly, entry of the instant Amendment, as an earnest attempt to advance prosecution and reduce the number of issues, is requested under 37 CFR 1.116.

Favorable reconsideration, withdrawal of the rejection set forth in the above-noted Office Action and an early Notice of Allowance are also requested.

Applicants' undersigned attorney may be reached in our Washington, D.C. office by telephone at (202) 530-1010. All correspondence should be directed to our address listed below.

Respectfully submitted,

A handwritten signature in black ink, appearing to read "Steven E. Warner", is written over a horizontal line.

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